NASA TECHNICAL MEMORANDUM NASA TM -75057

"ARIADNE" IS LESS COSTLY THAN THE "SPACE SHUTTLE"

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(NASA-TM-75057) ARIADNE IS LESS COSTLY THAN THE SPACE SHUTTLE (National Aeronautics and Space Administration) 7 p HC A02/MF A01 CSCL 22A
N78-12111
Unclas
G3/12 53580

Translation of "Ariane" Moins Chere que la "Navette Spatiale," Air et Cosmos, No. 685, pp. 41 & 43, Sept. 24, 1977

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, DC 20546 OCTOBER 1977

STANDARD TITLE PAGE

1. Report No. NASA TM-75057	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle "ARIADNE" IS LESS COSTLY THAN THE "SPACE SHUTTLE"		5. Report Date October 1977 6. Performing Organization Code
7. Author(s) Pierre Langereux		8. Performing Organization Report No. 10. Work Unit No.
9. Performing Organization Name and Address Transemantics, Inc. 1901 Pennsylvania Ave., NW, Suite 407. Washington, DC 20006		11. Contract or Grant No. NASw-2792 13. Type of Report and Period Covered Translation
12. Sponsoring Agency Name and Address NATIONAL AERONAUTICS AND SPACE ADMINISTRATION Washington, DC 20546		14. Sponsoring Agency Code

15. Supplementary Notes

Translation of "Ariane". Moins Chere que la "Navette Spatiale," Air et Cosmos, No. 685, pp. 41 & 43, Sept. 24, 1977

16. Abstract

This article is about "Ariadne", the European rocket. In comparison, the "Ariadne" has been found to be less costly thatn the American "Space Shuttle", judging by the price proposals sent to Intelsat for the orbiting of its three latest telecommunications satellites in the "Intelsat 5" series. The "Ariadne" is being offered by the E.S.A. and C.N.E.S at a ceiling price of $20 million, while the "Shuttle" is priced by N.A.S.A. at $22.5 million under the same condition, but these prices announced are by no means final. Neither the U.S. nor E.S.A. have endorsed these prices officially. They are being presented as estimates. The "Ariadne" has a "ceiling" price, which can only be adjusted downwards, if need be. The launching prices of both of these spacecraft do not include the cost of adapting the "Intelsat 5" satellites, designed for the "Atlas Centaur" rocket.

As for the credibility of the two launchers, Comsat recently acknowledged that the "Ariadne" program was not as risky as the "Shuttle" program, and that the "Ariadne" is approximately one year ahead of the "Shuttle". More battles are yet to come.

17. Key Words (Selected by Author(s))	18. Distribution Statement
	Unclassified-Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22.
Unclassified	Unclassified	5	

"ARIADNE" IS LESS COSTLY THAN THE "SPACE SHUTTLE"

Pierre Langereux

"Ariadne", the European rocket, has been found to be less costly /41
than the American "Space Shuttle", judging by the price proposals sent to Intelsat for the orbiting of its three latest telecommunications satellites in the "Intelsat 5" series (Nos. 5, 6 and 7) beginning in 1980 (the first four "Intelsat 5" satellites are being launched with "Atlas-Centaur" rockets).

"Ariadne" is being offered by the European Space Agency (E.S.A.) and the National Center for Space Studies (Centre National d'Etudes Spatiales - C.N.E.S.) at a ceiling price of $20 million, while the "Shuttle" is priced by N.A.S.A. at $22.5 million under the same conditions, i.e., in 1977 dollars for the geostationary transfer orbiting (apogee ≈ 36,000 km) of an "Intelsat 5" satellite (950 kg). These offers include a price escalation scale, depending on inflation, based on 7% per year for the American prices and almost as much for the European prices; the E.S.A. offer includes either an annually adjustable lump-sum price or a fixed price incorporating initially an estimate of inflation.

In both cases, the prices announced are by no means final yet: the U.S. prices have not been endorsed by N.A.S.A.'s backers, while E.S.A. prices - drawn up with the agreement of C.N.E.S., on the basis of industrial contract prices - still have to be officially confirmed by member-countries, although they are aware of them already and have approved them.

These data, however, are sufficiently sobering to merit discussion and evaluation, since this is how they were officially presented to a potential user (Intelsat) for a competitive contract.

In the case of the "Shuttle", the $22.5 million price tag is presented by N.A.S.A. as an estimated base cost (subject to readjustment) which includes the cost of the "Shuttle" and $4 million for the upper, non-reusable

powder stage, "SSUS-A", specially built to launch the "Intelsat 5" satellites from the low orbit of the "Shuttle", which is launched from Cape Canaveral, Florida. Furthermore, this price entails a "shared" launching between the "Intelsat 5" satellite and another, smaller satellite of the "Thor Delta" class to be placed in orbit at the same time. Otherwise, Intelsat would have to pay an additional $10 million in order for its satellite to enjoy an "exclusive" launching.

As for the "Ariadne", the offer submitted to Intelsat on September 6 has a "ceiling" price which can only be adjusted downwards, if need be, and is for an exclusive launching of an "Intelsat 5" satellite on a date chosen by Intelsat (between November 1980 and mid-1983 for the 5th satellite, in mid-1981 for the 6th, and in mid-1982 for the 7th). This "Ariadne" price is based on the assumption of two firings a year from the Kourou base (C.S.G.) in French Guyana.

These "Shuttle" or "Ariadne" launching prices obviously do not include the cost of adapting the "Intelsat 5" satellites, designed for the "Atlas-Centaur" rocket. An estimate made several months ago gave a cost of about $5 million for adapting the "Intelsat 5's" to the "Shuttle". There is no mention of an adaptation clause for the "Ariadne" in the contract with Ford Aerospace, manufacturer of the satellites, but Comsat's technical director recently told the Intelsat Council of Governors that compatibility with the European launcher - very similar to the "Atlas-Centaur" - posed no special problems.

For the time being, then, Intelsat is keeping its two options open, despite pressures from N.A.S.A., which is pushing for the irreversible choice of the "Shuttle" (asking that appropriations for the "SSUS-A's" - $2 to 3 million - be made available immediately). In point of fact, neither one of the solutions proposed can be eliminated on the basis of price. As for the credibility of the two launchers, Comsat recently acknowledged that the "Ariadne" program was not as risky as the "Shuttle" program. C.N.E.S., in turn, estimates that the "Ariadne" is approximately one year ahead of the "Shuttle", comparing the same stages in both programs. The political battles are yet to come, however.

December has been set for the report by Intelsat's Director General to the Council of Governors, which is then scheduled to choose between the two proposals; however, a firm order for the three launchers is not anticipated before mid-1978. Europe is hopeful of being able to include the "Ariadne" option in the Ford Aerospace contract, but it would be surprising if, meanwhile, the U.S. did not make a counter-proposal for the "Shuttle" at a lower price!

And yet, contrary to the various statements by N.A.S.A. on the competitiveness of the "Shuttle", the fact remains that the reusable "Shuttle" is more costly than the traditional European launcher. This is indeed a revelation.

It should be noted at this point that the new prices announced by N.A.S.A. have considerably increased over the figures officially announced last June. Thus, for the launching of a geostationary "Atlas-Centaur" type satellite, prices (in 1977 dollars) rose from $16.5 million (equivalent to $15.4 million at the 1976 price) to $22.5 million, i.e., an increase of over 36% in four months!

This is not to say that the new estimates are any more definitive than the old ones, as N.A.S.A. would have one believe. There are doubts as to the reliability of these prices, excluding as they do numerous factors normally taken into account for conventional American launchers. For example, the depreciation cost of the five "Orbiters" - $600 million each - designed to make at least 100 flights apiece, is not included, representing $6 million per flight. Moreover, the actual operating costs of an entirely new craft such as the "Shuttle" can still not be evaluated with total accuracy, according to the General Accounting Office: the actual service life of the engines (designed for 55 flights) or of the (permanent) thermal protective cladding, or reutilization of the powder boosters (for 10 flights) after recovery at sea, etc. N.A.S.A.'s mission model for its "Shuttle" fleet (572 flights in 12 years at a payload of 29.5 tons per flight) appears rather optimistic at present, equating to approximately one flight per week each year!

The price policy proposed by E.S.A. for "Ariadne" and which is to be approved by member-countries at the end of October, in general provides for two sets of rates, depending on the users.

For the Agency and member-countries, the prices will be set at a "reasonable" level, taking into account the production schedule and including both direct costs (rocket production, launching costs, etc.) and indirect costs (amortization of investments, etc.). Thus, the launching of a geostationary satellite of 900 - 1,000 kg would be invoiced at 28.5 million accounting units (slightly over $30 million) and a 450 - 500 kg geostationary satellite launching at 22.5 million accounting units. "Ariadne", however, will also be able to undertake "double launchings" of 450 - 500 kg class satellites for a total price of 29 million accounting units (with 0.5 million accounting units for the adaptor), or 14.5 million accounting units per satellite.

Not included in these figures are costs involving the launch pad (CSG), amounting to approximately 100 million francs per year. Currently, and up until the end of 1980, they are taken into account separately by France for the most part and by the member-countries, participating contractually (20 million accounting units out of 76 million over 5 years). After 1980, E.S.A. plans to extend the system, but by increasing, as France hopes, the participation of the member-countries.

For users who are not members of the E.S.A., the prices will be set /43
so that they are competitive with market prices. Basically, they will include recurring costs (fixed costs not included), but not to such an extent that the launcher is sold at a loss, i.e., without requiring a subsidy from member-countries. The cost price of the "Ariadne", which will depend on the rhythm of production adopted, was estimated in 1976 prices at 22.3 million accounting units for 4 firings per year, and at 27 million accounting units for 2 firings per year, using the formula: recurring cost of 17.65 million accounting units + fixed costs of 18.75 million accounting units divided by the number of launchings.

This principle will be applied for the first batch of launchers, referred to as the "Promotion Series", production of which is to be determined before the end of the year by the E.S.A. Council. This series currently includes six rockets for European requirements: "Exosat" satellites, late 1980 - early 1981; "ECS 1" in 1981; "ECS" 2 in 1982; "H-SAT", early 1982; and "SPOT" in 1983; the sixth launcher will be held in reserve for a foreign satellite (Intelsat 5, Anick C, Comstar, Insat or Norsat).